Interagency Ecological Program for the Sacramento-San Joaquin Estuary

Newsletter

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For information on the Interagency Ecological Program, visit our home page on the World Wide Web (www.iep.water.ca.gov).

Readers are encouraged to submit brief articles or ideas for articles. Correspondence, including requests for changes in the mailing list, should be addressed to Randy Brown, California Department of Water Resources, 3251 S Street, Sacramento, CA 95816-7017.

Interagency Program Quarterly Highlights

These Quarterly Highlights summarize significant activities and findings of the Interagency Program during the past 3 months.

Delta Flow Measurement

Rick Oltmann

Two UVM flow measurement sites damaged by the January floods were repaired and are operational again: San Joaquin River at Stockton, back up on March 27; and Sacramento River at Rio Vista, back up on May 21.

On April 1-2, ADCPs were deployed at six locations in the southern delta as part of a fish release and temporary barrier cooperative study by FWS, DFG, and DWR. ADCPs were deployed at:

- San Joaquin River between Turner Cut and Columbia Cut
- Turner Cut
- Middle River between Columbia Cut and Connection Slough
- Victoria Canal
- Old River between the Clifton Court Forebay intake and Grant Line Canal
- Grant Line Canal east of Tracy Road Bridge and the temporary barrier at the head of Old River

The intent is to use the vertical velocity profile data measured by the ADCP as a velocity index in the same manner as the UVM-measured horizontal velocity index is being used. In other words, a velocity relationship will be developed for each ADCP site from numerous flow measurements using the downward-looking ADCP flow measuring system to produce a mean cross-sectional velocity, which in turn will be used to calculate flow. The ADCPs were retrieved in late June; we hope to generate about 3-month time series of 15-minute-interval flow data for each of the six

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sites. The flow data will contribute to our knowledge of delta hydrodynamics, be used for hydrodynamic model calibration, and be used to analyze dye concentration data as part of the study described below. Numerous calibration flow measurements have already been made, but calibration cannot be completed until the ADCPs have been retrieved and the velocity data have been downloaded.

On April 28, FWS and DFG released 50,000 salmon smolts to the San Joaquin River at Mossdale, which is about 3 miles upstream of the temporary barrier installed this spring at the head of Old River. About an hour before the fish were released, USGS poured 48 liters of rhodamine-WT dye into the river near the release site to track movement of the water mass. Movement of the dye was tracked using automatic samplers installed at nine locations throughout the delta, each set to collect hourly samples. Some dye sampling sites were at ADCP sites and some were at UVM sites. Water samples were collected for a little over 2 weeks after release of the dye. The ADCP and UVM flow data will be used to analyze these concentration data, and the dye movement dataset will be used to calibrate delta transport models.

Delta Modeling

Chris Enright

In November 1996, the CALFED Bay/Delta Program asked DWR's Suisun Marsh Branch to recalibrate the Delta Simulation Model 1 (DSM1) (Suisun Marsh Version) in response to concerns that the model is not adequately calibrated with flow data. We have now completed three major tasks:

- Channel geometry was revised using a new bathymetry database and specialized spatial data viewing software.
- The DSM1 hydrodynamics model was recalibrated against USGS and DWR flow data for 2-week periods in May 1988, January 1993, and May 1994.
- The DSM1 salinity model was recalibrated against tidal-day average salinity for water years 1992-1994.

The hydrodynamic model and salinity model responses as compared to field data have improved. Results of the completed tasks were presented at the CALFED Storage and Conveyance public meeting on June 25. Verification of both the hydrodynamics and salinity models against an independent dataset is planned as part of the final report on the project to CALFED.

The final report will include recommendations for bathymetry surveys of the delta and Suisun Bay and dye studies to identify transport characteristics of various regions of the delta and to provide data for future model calibration. We expect these recommendations to be formalized within the Delta Model project work team and the Particle Tracking project work team. A summary article is also planned for the fall *Newsletter*.

For more information, check the web site at http://www.iep.water.ca.gov (click on CALFED) or contact Chris Enright (916/227-7521; cenright@water. ca.gov).

Phytoplankton Monitoring

Peggy Lehman

The first major increase in chlorophyll *a* concentration since the beginning of the year occurred in April and May in the southern delta. Here chlorophyll *a* concentrations reached 36-40 µg/L and were associated with a mixed phytoplankton community dominated by *Coscinodiscus* spp., *Skeletonema potamos*, and *Thalassiosira eccentricus*. Relatively high chlorophyll *a* concentrations of 6-9 µg/L were also measured in the northern region at Greens Landing, where concentrations are commonly below 5 µg/L. As has been common since the increase in *Potamocorbula amurensis* in 1987, chlorophyll *a* concentrations in April and May were 0.6-3 µg/L in Suisun Bay and were accompanied by a mixed phytoplankton community. Downstream in San Pablo Bay, chlorophyll *a* concentrations of 7 µg/L were closer to those measured before the increase of *P. amurensis* in 1987.

Neomysis/Zooplankton Study

Jim Orsi

More than 200 *Acanthomysis* per cubic meter were found in Suisun Slough during the June survey. This is the highest abundance recorded for this species since it was introduced in 1992. *Acanthomysis* has been restricted to Suisun Bay and the western delta, but on the June survey one specimen was taken from the San Joaquin River at Stockton. *Neomysis* abundance was very low throughout the estuary, usually <1 per cubic meter. The highest abundance was in Suisun Slough.

Copepod abundance followed the pattern seen for the past several years. *Eurytemora* and *Sinocalanus* abundance was high in May and declined in June as abundance of *Pseudodiaptomus forbesi* increased. *Diaptomus* and *Cyclops* were not abundant and were found at scattered locations in the delta. *Limnoithona tetraspina* was the most abundant copepod; density exceeded 30,000 per cubic meter at Martinez.

Bay Species

Kathy Hieb

Sampling this spring has given us the first indication of the 1997 year-class strength of starry flounder, longfin smelt, and Pacific herring. Bay Study otter trawl catches of young-of-the-year starry flounder in May and June were comparable to catches in 1980, 1982, and 1986, years with the highest young-of-the-year indices for the study period (1980-1996). However, sport fishery data indicate the San Francisco area population has been much smaller in the 1980s and 1990s than it was in the 1960s and 1970s.

Young-of-the-year starry flounder were widely distributed this spring, with catches in lower South Bay and from San Pablo Bay to Rio Vista on the Sacramento River and False River on the San Joaquin River (our most upstream stations). In April and early May, the Delta Smelt 20mm Survey collected a large number of transforming larvae and newly settled juveniles (7-10 mm total length) over much of the study area. Highest catches were in the lower Napa River, Montezuma Slough, near the confluence of the Sacramento and San Joaquin rivers, and Cache Slough. Later in May and in June they collected mostly small juveniles, ranging from 20 to 60 mm.

Although starry flounder hatch in highly saline water (primarily the ocean, but also the lower estuary), they rear in shallow brackish and fresh water. This is reflected by their distribution and salinity at point of capture — mean salinity for the 1997 20mm Survey was 3.5‰ in April (n=400), 1.9‰ in May (n=23), and 1.0‰ in June (n=15). Salinity decreased over time, because the earliest catches were partially comprised of migratory fish and the later catches were comprised of fish that had reached the nursery area. Mean salinity for the Bay Study is slightly higher than for the 20mm Survey, as we do not sample as far upstream; from 1980-1996, mean salinity was 2.8‰ for May (n=16) and 2.5‰ for June (n=262).

At the time of the early June Bay Study Survey, most longfin smelt young-of-the-year were not large enough to be effectively captured by otter and midwater trawls. The few young-of-the-year collected were widely distributed, with catches from Central Bay to the lower Sacramento River. Longfin smelt young-of-the-year were common in the 20mm Survey this spring, as the gear targets smaller fish (about 10-30 mm) than the Bay Study trawls. Fish were collected from the Napa River to the lower Sacramento River by this survey (note the downstream limit of the 20mm Survey is upper San Pablo Bay). Longfin smelt rear in brackish water, with few young-of-the-year collected where salinity is less than 1‰. Most longfin smelt first spawn at 2 years, with very few living to 3 years. This life cycle has resulted in a pattern of stronger year classes every other year in the estuary. Recently, the 1993 and 1995 year classes have been stronger than 1994 and 1996 year classes, leading to the prediction that the 1997 year class of longfin smelt will be relatively strong if the timing and amount of freshwater outflow this winter and spring are appropriate.

The Bay Study young-of-the-year Pacific herring catch for April-June was the highest in 7 years. This was in spite of the high freshwater outflow in January, which caused herring to delay spawning through most of the month (D. Watters, DFG, pers. comm.). Decreased salinity is beneficial to Pacific herring; in the laboratory the highest egg fertilization and hatching rates have occurred at 12-20‰. Although the Pacific herring population declined during the 1987-1992 drought, it has apparently rebounded with the return of higher flows. The spawning biomass of Pacific herring for the 1992-1993 fishing season was the lowest on record (which begins with the 1973-1974 season), while the biomass for the 1995-1996 and 1996-1997 seasons were the second highest and third highest on record, respectively.

Dale Sweetnam supplied the 20mm Survey data.

Juvenile Salmon

Mark Pierce

A major interdisciplinary study of juvenile salmon survival in the southern delta was conducted in late April in association with placement of a temporary barrier at the head of Old River. On April 28, 50,000 coded-wire tagged juvenile salmon were released at Mossdale in coordination with the release of dye (see "Delta Flow Measurement" highlight). We hope the integrated analysis of dye movement and fish recoveries from Real Time Monitoring sites, the state and federal water project fish facilities, Jersey Point, and Chipps Island will enhance our understanding of the timing and movement of fish relative to southern delta channel flows.

We also did experiments to evaluate the relative survival of coded-wire-tagged juvenile salmon using fish groups from the Feather River and Merced River hatcheries. Groups from both hatcheries were released simultaneously at Dos Reis on April 29 and at Jersey Point on May 2. The relative rates of recovery of these two groups in Chipps Island sampling will help determine whether juvenile salmon from Sacramento basin hatcheries survive poorly when released as part of experiments. Chipps Island recapture rates of juvenile salmon released in the southern delta have always been very low, hampering evaluation of through-delta survival under various environmental conditions. We also did 48-hour net pen mortality checks for all releases. Few mortalities were observed, even

with temperature release differentials up to 15°F and with river temperature reaching 68°F.

This spring Hanson Environmental conducted kodiak trawls at Jersey Point to increase the number of tag recoveries. Of fish released in the southern delta, about 1,700 fish were recovered at Jersey Point vs. 863 at Chipps Island during the same period. The proportion of individual release groups recovered will not be known until tag processing is completed late this summer.

Groups of coded-wire-tagged juvenile salmon from Feather River Hatchery were released at Sacramento on April 15, May 1, and May 15, to index survival through the Sacramento River side of the delta. The Delta Cross Channel was closed after the first two groups were released but open for much of the time after the third release. Preliminary results show survival was much better for the first two release groups, but higher water temperature in mid-May may have contributed to the difference in survival. Survival indices will not be calculated until processing of Chipps Island tags is complete.

A fraction of the Coleman National Fish Hatchery fall-run production was tagged this year to allow us to track the Coleman fish through the delta and estimate their survival to Chipps Island via the Real-Time Monitoring program and trawling at Chipps Island. The original plan was to release the production in three equal parts, about 2 weeks apart, but an outbreak of IHN forced us to release most of the tagged fish early.

The Delta Subgroup of the Central Valley Salmon project work team has a draft work plan for 1997-98 monitoring and special studies. Recommendations include expanding trawling at Mossdale, Sacramento, and Chipps Island to year round (at least 2-3 days/week) using otoliths to determine when smolts enter the delta and how long they stay there, and rotary screw trap monitoring in the Sutter Bypass in conjunction with that at Knights Landing.

As in 1996, a group has been convened to address concerns about the adverse effects of proposed fall "make-up" pumping on emigrating juvenile spring chinook salmon. Based on the lack of fish seen to date in monitoring on Deer and Mill creeks, it is expected that juvenile spring-run abundance will be very low this year. This raises the concern that sample sizes in the monitoring fish leaving the tributaries will be too low to provide an effective trigger for Delta Cross Channel closures. Alternatives are being discussed.

Based on counts at Red Bluff Diversion Dam, the preliminary estimate of 1997 adult winter-run escapement is 450-780, which is higher than expected based on the low escapement (189) 3 years ago.

Category III Studies

Ted Sommer

Early this year a project work team was formed to examine fisheries, food chain, and contaminant issues in Yolo Bypass with funding from Category III and the Interagency Program. The team, chaired by Ted Sommer (DWR), includes staff from DFG, DWR, San Francisco State University, USFWS, USGS, and Jones and Stokes Associates. This year we focused on familiarizing ourselves with the system, testing field methods, and refining the study plan.

One of the primary tasks was to describe changes in aquatic habitat of the bypass during the year. USGS collected preliminary water samples from the Yolo Causeway and Sacramento River during high winter flows, which staff are analyzing for sediments and pesticides. Based on field visits, we prepared a 1996 "time line" describing major events and physical features during and after flooding. We took a set of aerial photographs to document ponding. The prints were scanned into electronic format, then geo-referenced to satellite imagery. Pond areas, locations, and land use types are being calculated. For comparison, we are also analyzing NASA satellite imagery of Yolo Bypass ponding in spring 1986.

Delays in obtaining endangered species take permits from NMFS and DFG were a mixed blessing. On the one hand, we were not able to sample fish during peak winter flows; on the other hand, we had more time to plan our sampling and obtain the necessary gear. Beginning in late February we were able to collect useful information from seasonal ponds after the flood water had receded.

Beach seining was the primary method tested in 1997, although it appears that a variety of net sizes and sampling approaches will be needed because of habitat variability. Beginning in early March, we conducted several net efficiency trials using marked juvenile hatchery salmon. The most successful method was deployment of "block net" followed by depletion sampling. A three-sided (50 foot x 30 foot) net is set to isolate part of a pond, then repeated hauls are performed within the area using a 50-foot beach seine. Regression analysis is used to fit a line to the successive hauls and calculate total abundance.

Although the primary objective of 1997 beach seine sampling was to test methods, we believe we collected some valuable data on salmon stranding and survival. We noted much lower salmon density than was apparent in Jones and Stokes and USFWS collections in 1996. The salmon we observed were primarily fall-run size, with modest numbers of winter-run and spring-run size, and coded-wire-tagged salmon. Salmon were observed in good condition through early May, when high water temperature caused mortality in the remaining ponds. We also caught an impressive variety of native (9) and non-native (16) species over the course of the winter and spring.

Sport Fish

Raymond Schaffter

Between May 5 and May 29, in an attempt to capture young-of-the-year sturgeon, we fished 198 overnight sets of baited minnow traps in the Sacramento River between Moulton Weir and Paintersville. Sampling emphasized locations upstream of the Interstate 80 (Elkhorn) bridge. Catches included prickly sculpin, tule perch, channel catfish, bluegill, and crayfish, but no young-of-the-year sturgeon. Concurrent interviews with commercial and sport crayfishers yielded one report of a young-of-the-year sturgeon (about 3 inches long) captured in a crayfish trap near Meridian several years ago. Our failure to capture young-of-the-year sturgeon may be due to gear inefficiency or unsuitability rather than an absence of sturgeon.

We were unable to sample with towed bottom-trawling gear during the spring because all program vessels small enough to trailer upriver but large enough to mount a powered winch were in use. We have scheduled sampling in the Sacramento River between Colusa and Ryde with otter and shrimp trawls during July, when a suitable vessel will be available.

Splittail

Ken Miller

We monitor resident fishes biennially during February, April, June, and August. This program began in 1995 and is patterned after a program conducted in 1980-1983. April 1997 electrofishing at 20 fixed 1-kilometer sites throughout the delta was completed as scheduled. A total of 31 species and 3,727 fishes was caught, of which 77% were introduced centrarchids — mostly bluegill, redear sunfish, and largemouth bass. Eleven species of native fishes made up 6.3% of the catch.

The June survey had sampled 17 of the 20 sites by June 25, when this report was prepared. Our sampling suggests that young-of-the-year splittail recruitment is lower this year than in 1995, which is the last time we sampled. We have captured only 19 splittail, all from three sites in the Sacramento River and Steamboat Slough. During June 1995, we captured 219 splittail from fourteen sites throughout the delta. The low numbers and absence of young-of-the-year splittail from the southern and eastern delta suggest reduced spawning success this year, especially in the San Joaquin and Mokelumne rivers.

Contra Costa Canal Intake Entrainment

Jerry Morinaka

We have developed a study plan to provide baseline biological data prior to screening of the Rock Slough intake in July 1999. The biological monitoring data will be used to evaluate performance of the fish screens. Monitoring of predators abundant near the intake is scheduled to begin in July, and fish entrainment sampling at the intake will begin as soon as we obtain the necessary sampling equipment.

No fishery monitoring has been conducted since early March, when Contra Costa Water District discontinued use of the Mallard Slough Pumping Plant due to water quality. Monitoring will resume when the pumping plant is operational again — likely not until the end of the year or early 1998.

Los Vaqueros Fish Screen Facility Monitoring

Jerry Morinaka

The Los Vaqueros fish screen facility, on Old River, is nearing completion. Pump testing began in June and the fish screen system will be tested in early July. Following successful completion of the testing, Contra Costa Water District plans to start operating the intake. Fishery monitoring will begin then to evaluate screen efficiency.

Bay/Delta E-Mail Reflector

The Interagency Program will soon embark on a 1-year evaluation of an electronic mail reflector dedicated to the exchange of bay/delta technical and other information. The list will be unmoderated.

Interagency Program staff will be subscribed automatically. Others interested in technical issues regarding the estuary are also welcome. To subscribe, contact Karl Jacobs (kjacobs@water.ca.gov) and ask to be placed on the list: baydelta@water. ca.gov.

We expect all participants to observe list protocol: identify yourself, no flaming, don't use the list for personal or commercial messages, *etc.* Anyone who does not follow the protocol may be deleted from the list at the discretion of the list manager.

The Interagency Coordinators will review use of the list periodically to determine if it should be continued.